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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/671,517	09/29/2003	Fumio Akama	045762-0181	9111

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FOLEY AND LARDNER  
SUITE 500  
3000 K STREET NW  
WASHINGTON, DC 20007

EXAMINER

PATEL, ISHWARBHAI B

ART UNIT PAPER NUMBER

2841

DATE MAILED: 04/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

4.9

**Office Action Summary**

Application No.

10/671,517

Applicant(s)

AKAMA, FUMIO

Examiner

Ishwar (I. B.) Patel

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 March 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-3 is/are pending in the application.
- 4a) Of the above claim(s) 3 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 2 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election with traverse of specie a1b2, claims 1-3, in the reply filed on March 24, 2005 is acknowledged. The traversal is on the ground(s) that all of the species can be examined without undue burden. This is not found persuasive because various embodiments constituting the species require search for different limitations, which will certainly be burdensome to the examiner. Further, claim 3, with the limitation "at least one of the thermosetting adhesive layer and the thermoplastic film is partially cut away" is not reading on the elected specie. That limitation is reading on feature b1, which is not elected. Therefore, claim 3 is withdrawn from further consideration.

The requirement is still deemed proper and is therefore made FINAL.

### ***Priority***

2. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been received and has been placed of record in the file.

### ***Drawings***

3. The drawings are objected to because the figures are improperly cross hatched. All of the parts shown in section, and only those parts, must be cross-hatched. The cross-hatching patterns should be selected from those shown on page 600-114/115 of the MPEP based on the material of the part. See also 37 CFR 1.84(h)(3) and MPEP § 608.02. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in

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reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

4. The disclosure is objected to because the thickness of the thermosetting adhesive layers is greater than the thickness of the opposing conductive layers, as claimed in claim 2, has not been described in the specification.

Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al., (US Patent No. 5,865,934), in view of Tomiyama et al., Japanese Patent No. JP02000114280A.

**Regarding claim 1**, Yamamoto et al., in figure 15B, discloses a multilayer circuit board in which interlayer connection is achieved by the contact of minute pointed protrusions (protrusion of 34', shown in detail in figure 15A), provided on a first conductive circuit layer (43), with a second conductive circuit layer (33'), wherein interlayer insulation is achieved by a film (32).

Yamamoto et al., fails to explicitly disclose the film having a three-layer structure, comprising a thermoplastic film inserted between a pair of thermosetting adhesive layers. However, Yamamoto et al., recites that the insulating film (32) is an insulating resin film having thermoplastic properties (column 10, line 52-58).

Tomiyama et al., discloses a film (adhesive film) having a three-layer structure, comprising a thermoplastic film inserted between a pair of thermosetting adhesive layers. Tomiyama et al., in figure 2, recites a film with heat resistant thermoplastic film (4) with thermosetting adhesive resin (5) on both the sides of the thermoplastic film (4). Tomiyama et al., further recites that this structure of the insulating film will avoid void at

adhesion interface during thermo compression bonding, (line 1-3, paragraph [0004] page 2 of 5, of the computer translation).

A person of ordinary skill in the art at the time of applicant's invention would recognize the advantage of using a three layer insulating film comprising a thermoplastic film inserted between a pair of thermosetting adhesive layers in compression bonding to avoid void at adhesion interface and have reliable bonding.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to provide the circuit board of Yamamoto et al., with the insulating film having a three-layer structure, comprising a thermoplastic film inserted between a pair of thermosetting adhesive layers, as taught by Tomiyama et al., in order to avoid void at adhesion interface and have reliable bonding.

**Regarding claim 2**, the modified circuit board of Yamamoto et al., discloses all the features of the claimed invention including the insulating film having a three-layer structure, comprising a thermoplastic film inserted between a pair of thermosetting adhesive layers, as applied to claim 1 above, but fails to disclose the thickness of the thermosetting adhesive layers is greater than the thickness of the opposing conductive layers, and the thickness of the thermoplastic film is less than 25  $\mu\text{m}$ .

Yamamoto et al., discloses the circuit board structure having conductive layers (43 and 33') of 35  $\mu\text{m}$ , (column 16, line 10-11 and line 26-27) and the insulating film (32, synthetic resin film, column 10, line 55-58) of about 50  $\mu\text{m}$ .

Tomiyama et al., recites that thickness of thermoplastic layer (2) is about 25  $\mu\text{m}$  and may differ, (page 2, paragraph [0006], line 5 the computer of the translation), which will read on the claimed limitation. Tomiyama et al., further discloses in an example, the thickness of thermosetting adhesive (5) about 75  $\mu\text{m}$  on one side and 50  $\mu\text{m}$ , on other side, (page 2 of 5, paragraph [0010], line 10), without finding any void at adhesion interface, which are greater than that of the conductive layers of Yamamoto et al., which are 35  $\mu\text{m}$ .

Further, it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to provide the modified circuit board of Yamamoto et al., with the thickness of the thermosetting adhesive layers greater than the thickness of the opposing conductive layers, and the thickness of the thermoplastic film less than 25  $\mu\text{m}$ , as taught by Tomiyama et al., in order to have a circuit board without void at adhesion interface and have reliable bonding.

### ***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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Odaira et al., US Patent No. 5,822,850, in figure 5A discloses a multilayer circuit board with interlayer connection (connection between copper patterns 3,3') achieved by the contact of minute pointed protrusions (point of element 2).

Bonafino et al., US Patent No. 5,103,292, in figure 1, discloses insulting film (composite 11) formed of thermoplastic layer (13) sandwiched by epoxy adhesive layers (15, 17).

Kweon et al. US Patent No., 6,452,282, in figure 2, discloses a three layer insulating adhesive with a base film (5) of 10-50  $\mu\text{m}$  thickness having two adhesive layers (6) on both the surfaces.

Schmidt, US Patent No. 5,457,881, in figure 2a-2h, disclose electrical connection in multilayer printed circuit board with pointed protrusion.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ishwar (I. B.) Patel whose telephone number is (571) 272 1933. The examiner can normally be reached on M-F (8:30 - 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (571) 272 1957. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Ishwar (I. B.) Patel  
Examiner  
Art Unit: 2841  
April 4, 2005